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(54) **COMMUNICATION USING HANDWRITTEN INPUT**

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G06F 17/21 (2006.01)
G06F 3/0488 (2013.01)

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CPC ***G06F 17/214*** (2013.01); ***G06F 3/04883*** (2013.01); ***G06K 9/00167*** (2013.01)

(58) **Field of Classification Search**
USPC 382/187, 188, 190, 209, 224, 116; 358/1.11, 1.15, 448, 452
See application file for complete search history.

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(57) **ABSTRACT**

Technologies are generally described for transmitting a handwritten input. In some examples, a method performed under control of a handwriting device may include receiving a handwritten input including a first part including a text message, recognizing the text message, identifying a user of the handwritten input, determining an emotion attribute of the identified user based on the handwritten input, determining a font information regarding a font of the first part based on the emotion attribute, generating a data file including the text message and the font information and transmitting the data file to a receiving device.

22 Claims, 8 Drawing Sheets

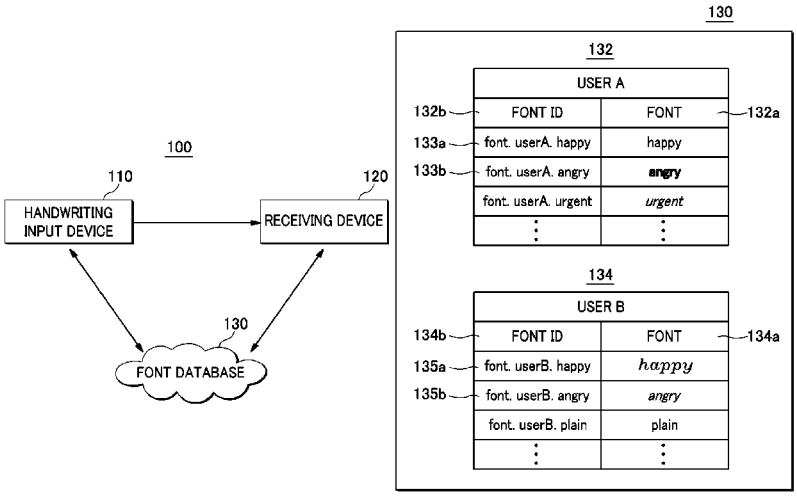

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FIG. 1A

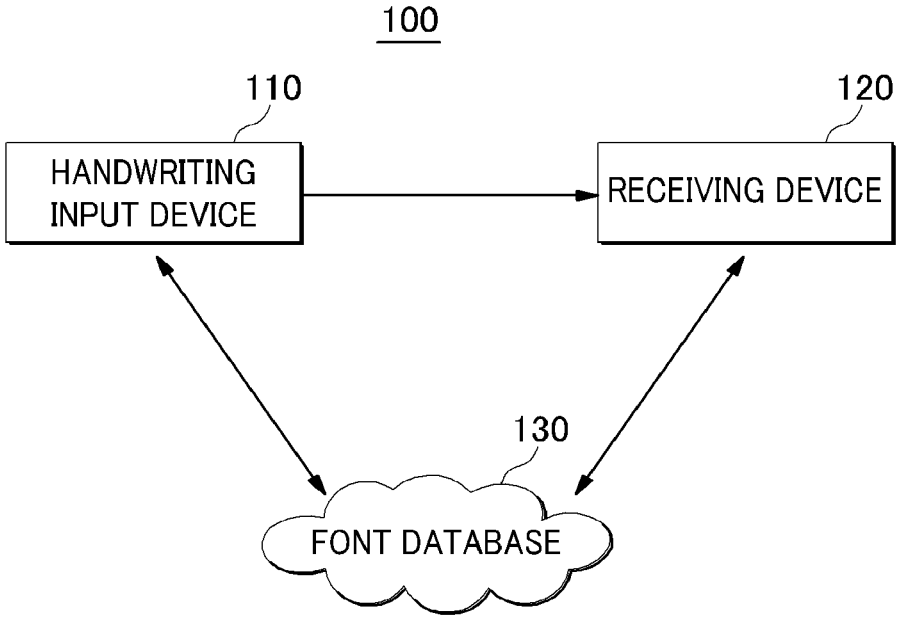

100
110
120
HANDWRITING INPUT DEVICE
RECEIVING DEVICE
130
FONT DATABASE

FIG. 1B

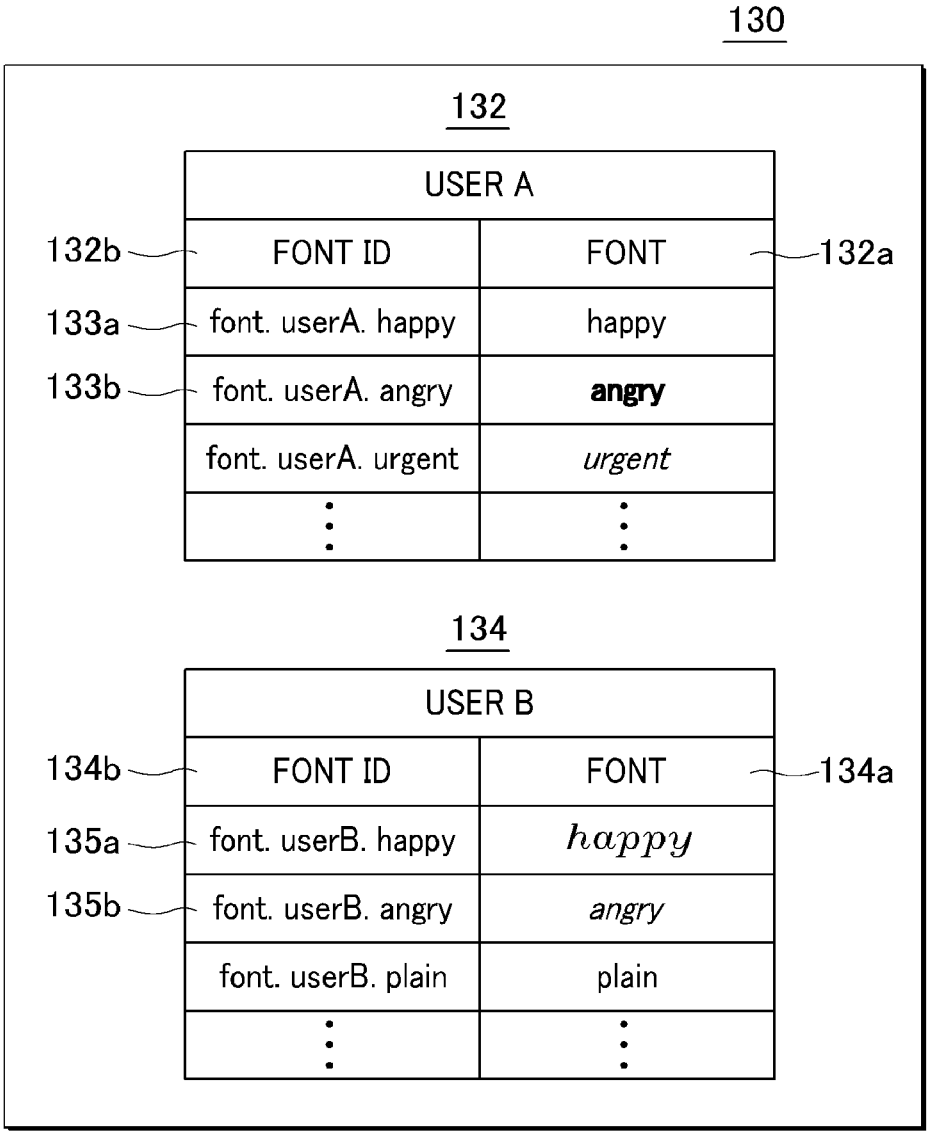

130
132
USER A
132b
FONT ID
FONT
132a
133a
font. userA. happy
happy
133b
font. userA. angry
angry
font. userA. urgent
urgent
134
USER B
134b
FONT ID
FONT
134a
135a
font. userB. happy
happy
135b
font. userB. angry
angry
font. userB. plain
plain

FIG. 2

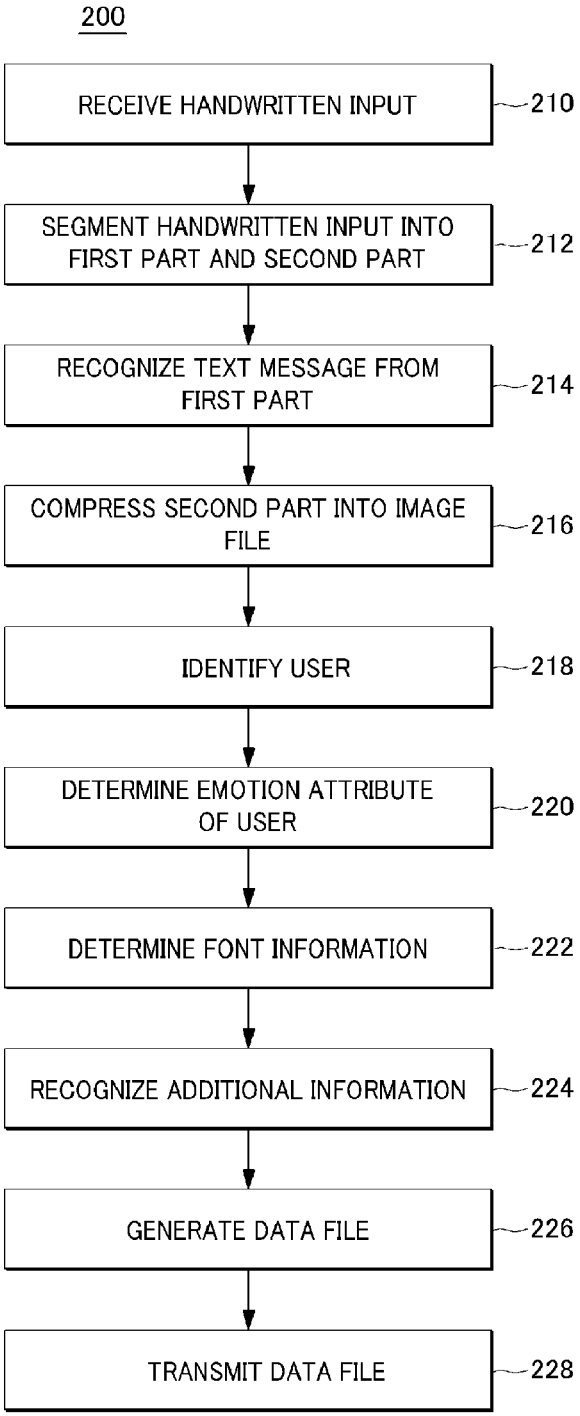

200
RECEIVE HANDWRITTEN INPUT
210
SEGMENT HANDWRITTEN INPUT INTO FIRST PART AND SECOND PART
212
RECOGNIZE TEXT MESSAGE FROM FIRST PART
214
COMPRESS SECOND PART INTO IMAGE FILE
216
IDENTIFY USER
218
DETERMINE EMOTION ATTRIBUTE OF USER
220
DETERMINE FONT INFORMATION
222
RECOGNIZE ADDITIONAL INFORMATION
224
GENERATE DATA FILE
226
TRANSMIT DATA FILE
228

FIG. 3

300

	PLAIN	CALM SINCERE	HAPPY LOVERY	ANXIETY	EXCITED	DEPRESSED	ANGRY
WRITE SPEED	NORMAL	SLOW	SLOW	FAST	FAST	SLOW	FAST
WRITE PRESSURE	NEUTRAL	SOFT	STRONG →SOFT	NEUTRAL STRONG	STRONG	SOFT	STRONG →STRONG
FONT SIZE	NORMAL	SMALL	SMALL	LARGE	LARGE	NORMAL	LARGE
LANE/ SIZE ALIGNMENT	NEUTRAL	WELL	WELL	BAD	BAD	NEUTRAL	BAD
TYPOS	NEUTRAL	SMALL	SMALL	MANY	MANY	MANY	MANY
LITERAL		WELL MADE LONG SENTENCE	"happy" "!"	"plz" "hurry"	"!"	"sad"	"mad"
NON- LITERAL			SMILE FACE heart symbol	"!!!"	underline	:-(	:-(((
OTHERS (schedule, place)		MORNING	PARTY, WEEKEND	D-day		be-fired	
GRIP PRESSURE	NEUTRAL	SOFT	NEUTRAL	STRONG	STRONG	SOFT	STRONG
BLOOD PRESSURE	MID	LOW	LOW	MID-HIGH	HIGH	LOW	HIGH
SWEAT	NEUTRAL	LESS	LESS	MUCH	MUCH	LESS	MUCH
TEMPERATURE	NEUTRAL	NEUTRAL	NEUTRAL	HIGH	HIGH	NEUTRAL	HIGH
FACIAL RECOGNITION	NORMAL	NORMAL	SMILE	NORMAL	EXCITED	DEPRESSED	ANGRY
VOICE	NEUTRAL	SOFT	DYNAMIC	HIGH, FAST	HIGH, FAST	SOFT, SLOW	HIGH, FAST

FIG. 4

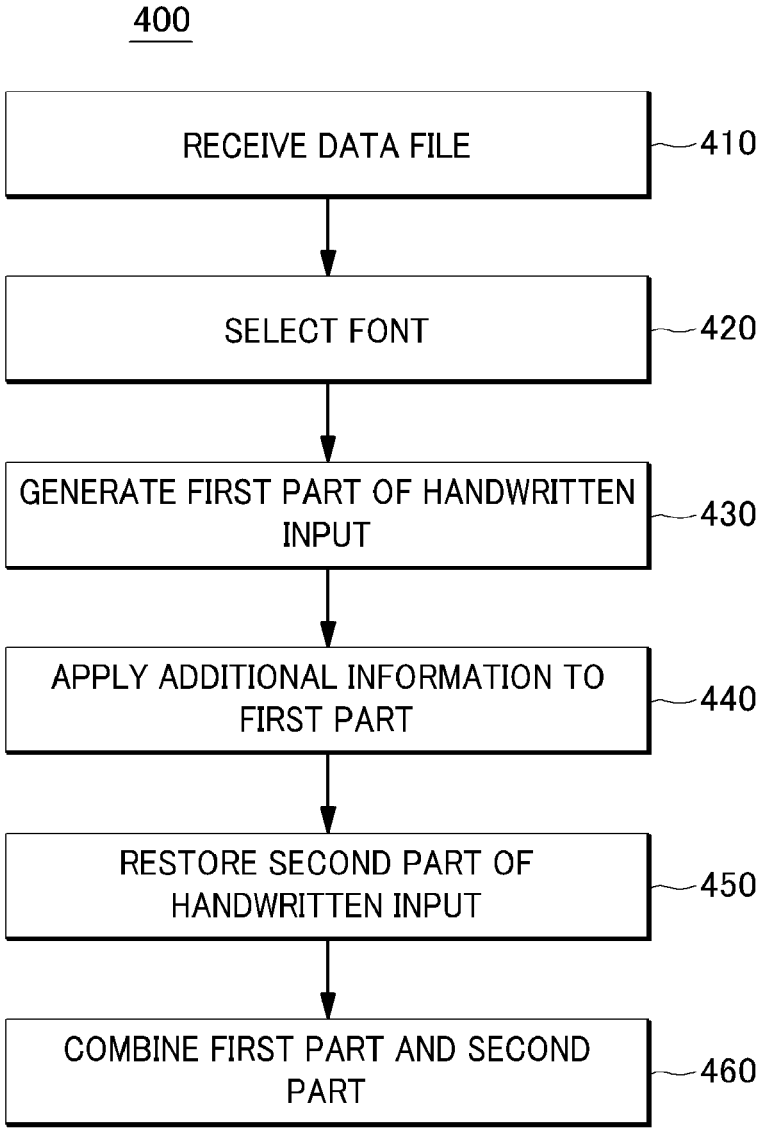

400
RECEIVE DATA FILE
410
SELECT FONT
420
GENERATE FIRST PART OF HANDWRITTEN INPUT
430
APPLY ADDITIONAL INFORMATION TO FIRST PART
440
RESTORE SECOND PART OF HANDWRITTEN INPUT
450
COMBINE FIRST PART AND SECOND PART
460

FIG. 5

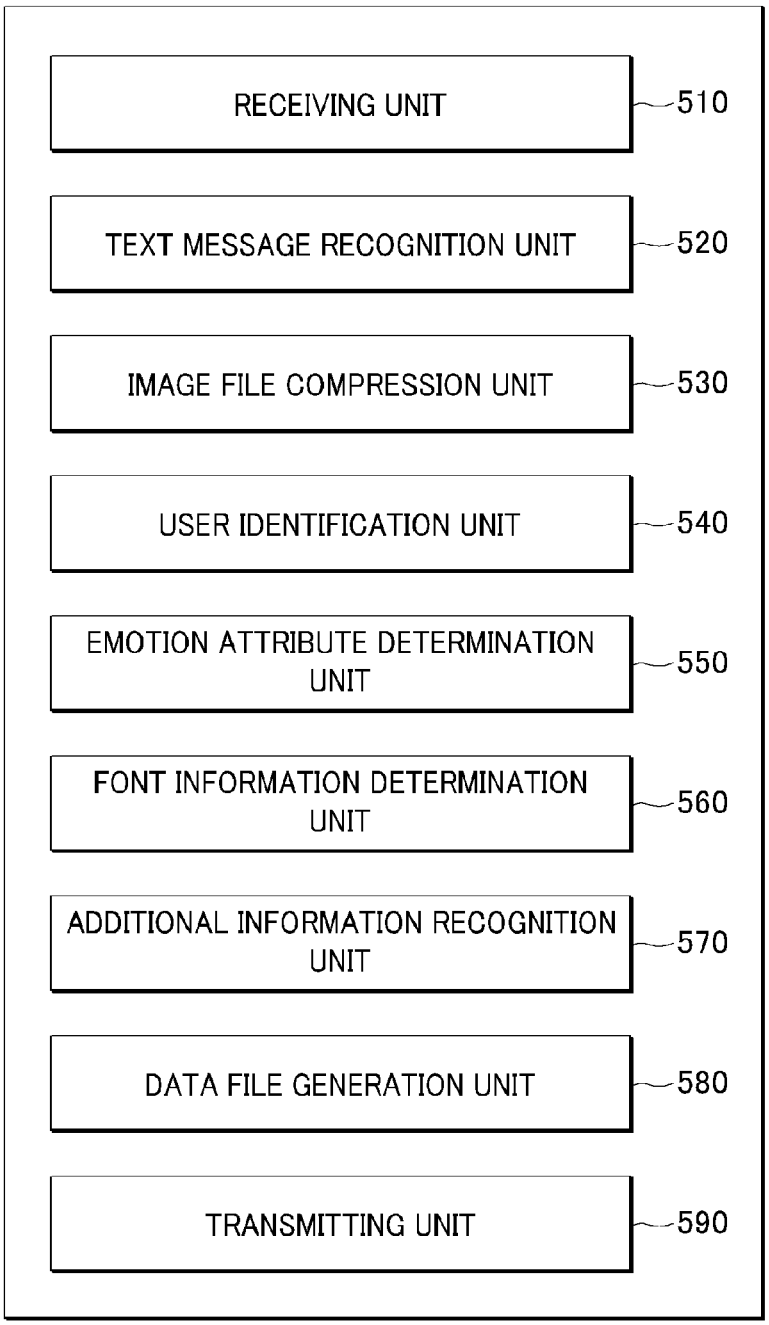

110
RECEIVING UNIT
510
TEXT MESSAGE RECOGNITION UNIT
520
IMAGE FILE COMPRESSION UNIT
530
USER IDENTIFICATION UNIT
540
EMOTION ATTRIBUTE DETERMINATION UNIT
550
FONT INFORMATION DETERMINATION UNIT
560
ADDITIONAL INFORMATION RECOGNITION UNIT
570
DATA FILE GENERATION UNIT
580
TRANSMITTING UNIT
590

FIG. 6

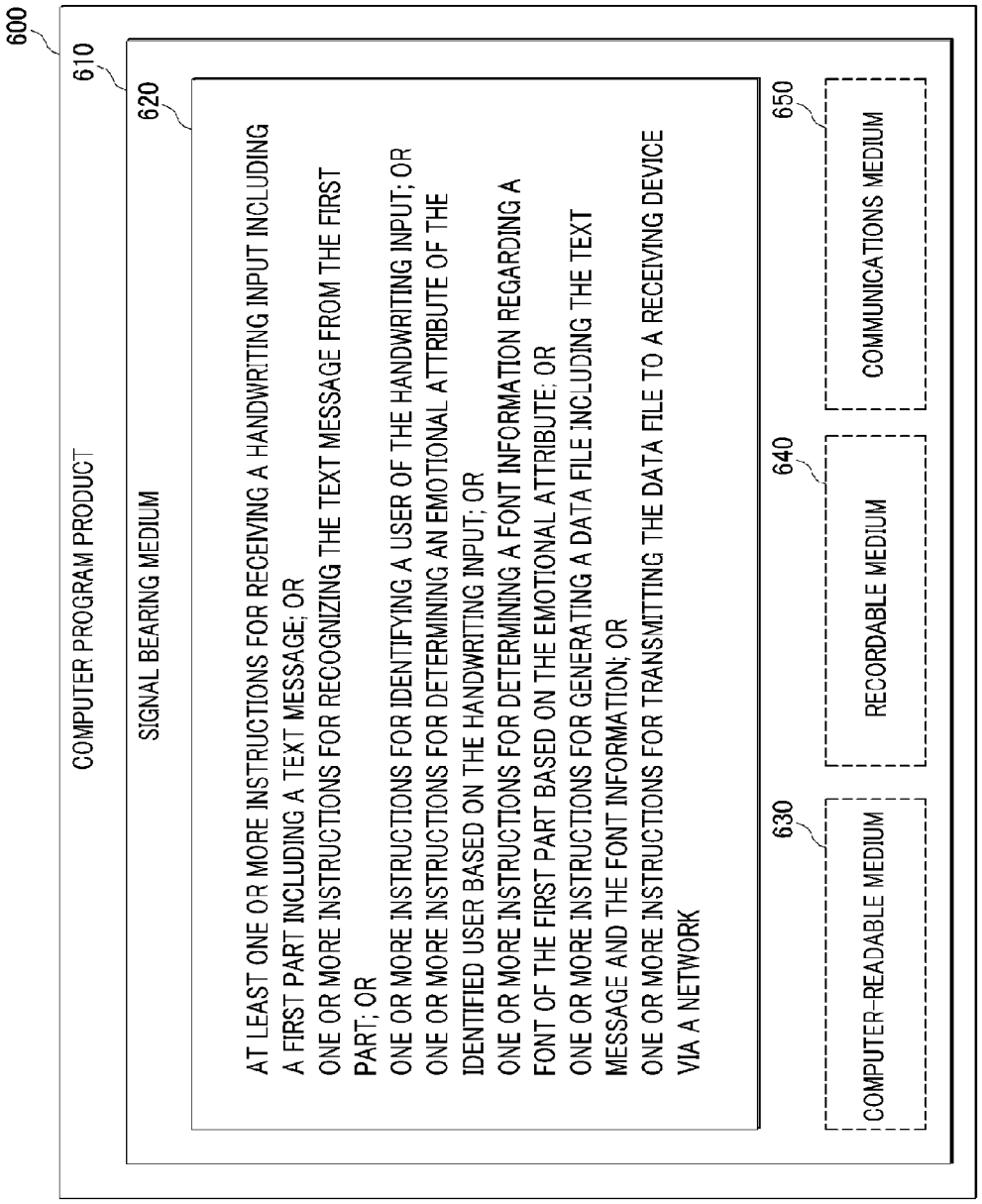
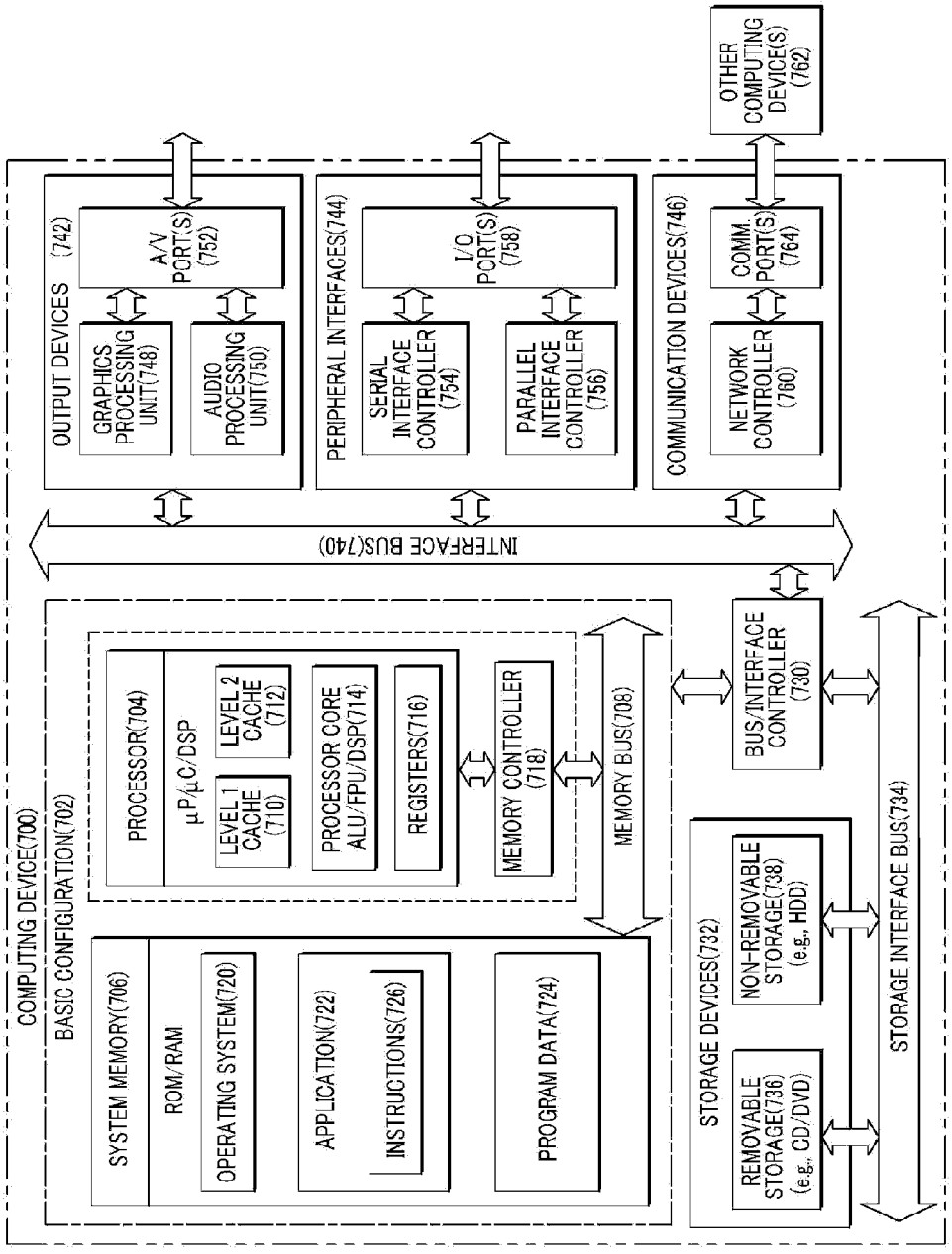

600
610
COMPUTER PROGRAM PRODUCT
620
SIGNAL BEARING MEDIUM
AT LEAST ONE OR MORE INSTRUCTIONS FOR RECEIVING A HANDWRITING INPUT INCLUDING A FIRST PART INCLUDING A TEXT MESSAGE; OR
ONE OR MORE INSTRUCTIONS FOR RECOGNIZING THE TEXT MESSAGE FROM THE FIRST PART; OR
ONE OR MORE INSTRUCTIONS FOR IDENTIFYING A USER OF THE HANDWRITING INPUT; OR
ONE OR MORE INSTRUCTIONS FOR DETERMINING AN EMOTIONAL ATTRIBUTE OF THE IDENTIFIED USER BASED ON THE HANDWRITING INPUT; OR
ONE OR MORE INSTRUCTIONS FOR DETERMINING A FONT INFORMATION REGARDING A FONT OF THE FIRST PART BASED ON THE EMOTIONAL ATTRIBUTE; OR
ONE OR MORE INSTRUCTIONS FOR GENERATING A DATA FILE INCLUDING THE TEXT MESSAGE AND THE FONT INFORMATION; OR
ONE OR MORE INSTRUCTIONS FOR TRANSMITTING THE DATA FILE TO A RECEIVING DEVICE VIA A NETWORK
630
COMPUTER-READABLE MEDIUM
640
RECORDABLE MEDIUM
650
COMMUNICATIONS MEDIUM

FIG. 7


COMPUTING DEVICE(700)
BASIC CONFIGURATION(702)
SYSTEM MEMORY(706)
ROM/RAM
OPERATING SYSTEM(720)
APPLICATION(722)
INSTRUCTIONS(726)
PROGRAM DATA(724)
PROCESSOR(704)
μP/μC/DSP
LEVEL 1 CACHE (710)
LEVEL 2 CACHE (712)
PROCESSOR CORE ALU/FPU/DSP(714)
REGISTERS(716)
MEMORY CONTROLLER (718)
MEMORY BUS(708)
INTERFACE BUS(740)
OUTPUT DEVICES (742)
GRAPHICS PROCESSING UNIT(748)
AUDIO PROCESSING UNIT(750)
A/V PORT(S) (752)
PERIPHERAL INTERFACES(744)
SERIAL INTERFACE CONTROLLER (754)
PARALLEL INTERFACE CONTROLLER (756)
I/O PORT(S) (758)
COMMUNICATION DEVICES(746)
NETWORK CONTROLLER (760)
COMM. PORT(S) (764)
OTHER COMPUTING DEVICE(S) (762)
BUS/INTERFACE CONTROLLER (730)
STORAGE DEVICES(732)
REMOVABLE STORAGE(736) (e.g., CD/DVD)
NON-REMOVABLE STORAGE(738) (e.g., HDD)
STORAGE INTERFACE BUS(734)

COMMUNICATION USING HANDWRITTEN INPUT

CROSS-REFERENCE TO RELATED APPLICATION

This Application is the National Stage filing under 35 U.S.C. §371 of PCT Application Ser. No. PCT/US13/23457 filed on Jan. 28, 2013. The disclosure of the PCT Application is hereby incorporated herein by reference in its entirety.

BACKGROUND

As touch-based electronic devices are being more widely used, interest in creating, storing and transmitting handwritten notes is increasing. When transmitting a handwritten note, the handwritten note may be stored on one device as an image file that includes a sizeable amount of data, from which the image file may be transmitted to another device. In such cases, the handwritten note can be transmitted, though transmission thereof may require significant bandwidth. A receiving party may recognize an author of the handwritten note and even the emotional state of the author just from the handwritten note. In other cases, a text message may be extracted from a handwritten note and may be further stored as a text file on a device, which is of a much small data size (i.e., as a plain text), from which the text file may be transmitted to another device. In these cases, bandwidth requirements for such a file transmission may be relatively smaller, but the receiving party receives a plain text only.

SUMMARY

In an example, a method performed under control of a handwriting input device may include: receiving a handwriting input including a first part including a text message, recognizing the text message from the first part, identifying a user of the handwriting input, determining an emotion attribute of the identified user based at least in part on the handwriting input, determining a font information regarding a font of the first part based at least in part on the emotion attribute, and generating a data file including the text message and the font information. The font of the first part may be selected from multiple fonts for the identified user.

In another example, a method performed under control of a receiving device may include: receiving a data file including a text message of a first part of a handwriting input and a font information regarding a font of the first part from a handwriting input device, selecting the font of the first part based at least in part on the font information, and generating the first part based at least in part on the text message and the font of the first part. The font information may be based at least in part on an emotion attribute of the user of the handwriting input device, and the font of the first part may be selected from multiple fonts for a user of the handwriting input device.

In yet another example, a handwriting input device may include: a receiving unit configured to receive a handwriting input including a first part including a text message, a text message recognition unit configured to recognize the text message from the first part, a user identification unit configured to identify a user of the handwriting input, an emotion attribute determination unit configured to determine an emotion attribute of the identified user based at least in part on the handwriting input, a font information determination unit configured to determine a font information regarding a font of the first part based at least in part on the emotion attribute, and a data file generation unit configured to generate a data file including the text message and the font information. The font of the first part may be selected from multiple fonts for the identified user.

In yet another example, a computer-readable storage medium may store thereon computer-executable instructions that, in response to execution, cause a handwriting input device to perform operations including receiving a handwriting input including a first part including a text message, recognizing the text message from the first part, identifying a user of the handwriting input, determining an emotion attribute of the identified user based at least in part on the handwriting input, determining a font information regarding a font of the first part based at least in part on the emotion attribute, generating a data file including the text message and the font information, and transmitting the data file to a receiving device via a network. The font of the first part may be selected from multiple fonts for the identified user.

In yet another example, a computer-readable storage medium may store thereon computer-executable instructions that, in response to execution, cause a receiving device to perform operations including receiving a data file including a text message of a first part included in a handwriting input and a font information regarding a font of the first part from a handwriting input device, determining the font from the first part based at least in part on the font information, and generating the first part based at least in part on the text message and the font of the first part. The font information may be based at least in part on an emotion attribute of the user of the handwriting input device, and the font of the first part may be selected from multiple fonts for a user of the handwriting input device.

The foregoing summary is illustrative only and is not intended to be in any way limiting. In addition to the illustrative aspects, embodiments, and features described above, further aspects, embodiments, and features will become apparent by reference to the drawings and the following detailed description.

BRIEF DESCRIPTION OF THE FIGURES

The foregoing and other features of this disclosure will become more fully apparent from the following description and appended claims, taken in conjunction with the accompanying drawings. With the understanding that these drawings depict only several embodiments in accordance with the disclosure and are, therefore, not to be considered limiting of its scope, the disclosure will be described with additional specificity and detail through use of the accompanying drawings, in which:

FIG. **1**A schematically shows an illustrative example of a communications environment including a handwriting input device, a receiving device and a font database, arranged in accordance with at least some embodiments described herein;

FIG. **1**B schematically shows an illustrative example of individual font databases stored in a font database, arranged in accordance with at least some embodiments described herein;

FIG. **2** shows an example flow diagram of a process for a handwriting input device transmitting a handwriting input to a receiving device, arranged in accordance with at least some embodiments described herein;

FIG. **3** schematically shows an illustrative example of an emotion attribute table, arranged in accordance with at least some embodiments described herein;

FIG. **4** shows an example flow diagram of a process of a receiving device for receiving a handwriting input from hand-

writing input device, arranged in accordance with at least some embodiments described herein;

FIG. **5** shows a schematic block diagram illustrating an example architecture for a handwriting input device, arranged in accordance with at least some embodiments described herein;

FIG. **6** illustrates computer program products that may be utilized to provide a scheme for communication using handwriting input, arranged in accordance with at least some embodiments described herein; and

FIG. **7** is a block diagram illustrating an example computing device that may be utilized to provide a scheme for communication using handwriting input, arranged in accordance with at least some embodiments described herein.

DETAILED DESCRIPTION

In the following detailed description, reference is made to the accompanying drawings, which form a part hereof. In the drawings, similar symbols typically identify similar components, unless context dictates otherwise. The illustrative embodiments described in the detailed description, drawings, and claims are not meant to be limiting. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the subject matter presented herein. It will be readily understood that the aspects of the present disclosure, as generally described herein, and illustrated in the Figures, can be arranged, substituted, combined, separated, and designed in a wide variety of different configurations, all of which are explicitly contemplated herein.

This disclosure is generally drawn, inter cilia, to methods, apparatuses, systems, devices, and computer program products related to communication schemes using a handwriting input including at least one of a text message and an image. Technologies are generally described for transmitting a handwriting input from a handwriting input device to a receiving device while maintaining an individual font of a user of the handwriting input.

In some examples, a handwriting input device may receive a handwritten input that includes a first part including a text message and a second part including an image. The handwriting input device may segment the handwritten input into the first part and the second part. The handwriting input device may compress the second part that includes the image into an image file and recognize the text message from the first part using a conventional text recognition method. Further, the handwriting input device may utilize at least the handwritten input to determine an emotion attribute of an author or originator of the handwritten input. By way of examples, but not limitation, the handwriting input device may determine the emotion attribute based on contents of the text message, a size of the first part of the handwritten input, apparent speed at which the handwritten input is input to the device, apparent physical pressure applied to the device while the handwritten input is input to the device, line alignment of the first part of the handwritten input, consistency in size of letters and/or characters in the first part of the handwritten input, a number of spelling errors included in the first part, one or more emoticons included in the first part of the handwritten input, and/or one or more symbol characters included in the first part of the handwritten input. Then, the handwriting input device may determine font information regarding a font of the first part based on the emotion attribute of the user. The font information may include an identifier (i.e., a font ID) for each font of one or more fonts of the author or originator of the handwritten input. The font corresponding to the font information may be stored in an individual font database of the user, which may be stored in a cloud database center which may store multiple individual font databases for respective users. The cloud database center may be hosted or serviced by a service provider, which may also provide an application for use in the handwriting input device and/or a receiving device that receives the handwritten input from the handwriting input device. The handwriting input device and/or the receiving device may access the cloud database center using the application for retrieving, storing and/or updating the fonts of the individual font databases. Further, the handwriting input device may have an individual secret key or a password and access to the individual font database stored in the cloud database center using the individual secret key or the password.

The handwriting input device may generate a data file, including the compressed image file, the text message and the font information, and transmit the data file (together with the individual secret key or the password necessary for accessing to the individual font database) to a receiving device. The receiving device may decompress the compressed image file into the original image using a conventional image file decompressing method and also recognize the text message. Further, the receiving device may select the font corresponding to the font information from multiple individual fonts which are stored in the individual font database. By way of examples, but not limitation, the receiving device may access to the individual font database stored in the cloud database center by inputting the individual secret key or the password. Then, the receiving device may apply the font to the text message, so that the text included in the handwritten input can be restored. Further, the receiving device may combine the original image and the restored text to restore the original handwritten input.

FIG. **1**A schematically shows an illustrative example of a communications environment **100** including a handwriting input device **110**, a receiving device **120** and a font database **130**, arranged in accordance with at least some embodiments described herein. In accordance with at least one example embodiment, handwriting input device **110** may receive a handwritten input from a user. By way of examples, but not limitation, handwriting input device **110** may include a tablet computer, a tablet device or a smartphone having a touch screen such as a capacitive touch screen or a resistive touch screen. The handwritten input may include a first part including a text message and a second part including an image.

Handwriting input device **110** may recognize the text message from the first part of the handwritten input using a conventional text recognition method. In some embodiments, handwriting input device **110** may extract the text message from the first part and save the extracted text message as a text file with a file name of, for example, "note.txt." Further, handwriting input device **110** may compress the second part of the handwritten input into an image file. In some embodiments, handwriting input device **110** may compress the image included in the second part into an image file with a file name of, for example, "figure.jpg."

Handwriting input device **110** may identify the user of the handwritten input based on, e.g., at least a font of the handwritten input, a device identifier, or log-in information regarding handwriting input device **110**. The device identifier may include, but is not limited to, a MAC address or an IP address of handwriting input device **110**.

Further, handwriting input device **110** may determine font information regarding a font utilized for the first part of the handwritten input. The font information may include information of the identified user and his/her font ID, and the font ID may correspond to an emotion attribute of the identified

user and will be described more in detail with reference to FIG. **1**B below. In some embodiments, in order to determine the font information, handwriting input device **110** may determine the emotion attribute of the identified user based at least in part on the handwritten input. By way of examples, but not limitation, the emotion attribute may include a calm state, a happy state, an urgent state, an excited state, a depressed state or an angry state. In some embodiments, handwriting input device **110** may determine the emotion attribute based at least in part on at least one of contents of the text message, a size of the first part of the handwritten input, text writing speed of the user, text writing pressure of the user, line alignment of the first part of the handwritten input, consistency in size of letters and/or characters in the first part of the handwritten input, a number of spelling errors included in the first part, one or more emoticons included in the first part of the handwritten input, and/or one or more symbol characters included in the first part of the handwritten input.

By way of examples, but not limitation, if the size of letters and/or characters in the first part of the handwritten input is relatively large compared to the touch screen of handwriting input device **110**, handwriting input device **110** may determine that the emotion attribute of the identified user is, e.g., an excited state. Further, handwriting input device **110** may determine the apparent text input speed of the user based on a writing time and the number of letters and/or characters in the first part. When the text writing speed is faster than a predetermined speed, handwriting input device **110** may determine that the emotion attribute of the identified user is, e.g., one of urgency.

Font database **130** may store one or more individual font databases for respective users, and each of the individual font databases may include one or more fonts for each user. Examples of the individual font databases will be shown below with reference FIG. **1**B. In some embodiments, font database **130** may include a cloud data center. By way of examples, but not limitation, font database **130** may be the cloud data center to which handwriting input device **110** and receiving device **120** may access for retrieving, storing and/or updating the fonts of the individual font databases. Fonts included in each of the individual font databases stored in font database **130** may be used as a match-up token of each user, so one may find users who have similar fonts easily. Handwriting input device **110** may access to font database **130** and look for a font that corresponds to the emotion attribute of the user and determine the font information regarding the font of the first part. When the font of the first part is a new font, handwriting input device **110** may store the font of the first part (which does not exist in font database **130**) and font information thereof in font database **130** and update font database **130**. Further, receiving device **120** may access font database **130** using a secret key or a password (which may have been provided by handwriting input device **110**) and select a font based on the font information from one or more of the user's fonts which are stored in font database **130**.

FIG. **1**B schematically shows an illustrative example of individual font databases stored in font database **130**, arranged in accordance with at least some embodiments described herein. As illustrated in FIG. **1**B, there may be multiple individual font databases **132** and **134** stored in font database **130**. Font database **132** may include one or more fonts **132***a* for a user A and corresponding font information (i.e. FONT ID **132***b* in FIG. **1**B) corresponding to each font for the user A; and, font database **134** may include one or more fonts **134***a* for a user B and corresponding font information (i.e. FONT ID **134***b* in FIG. **1**B) corresponding to each font for the user B. Fonts **132***a* and **134***a* included in individual font databases **132** and **134** may be determined based on unique handwriting characteristics of the user A and the user B, respectively, and the fonts of the user A and those of the user B may be different. Font database **130** may be formed and updated by a process of handwriting input device **110** collecting unique handwriting characters of the user. If the user of the handwritten input is a first time user, font database **130** may create a new individual font database for the first time user and store his/her font and font information thereof in the new individual font database.

By way of example, but not limitation, FIG. **1**B shows that the font corresponding to an angry state for the user A (i.e., the font id of "font.userA.angry" **133***b*) may be bold, while the font corresponding to the angry state for the user B (i.e., the font id of "font.userB.angry" **135***b*) may be italicized. The difference in fonts for a common emotion attribute between two different users may be due to, e.g., the user A applying significant pressure to the input device when writing in an angered state and the user B writing rapidly when writing in an angered state.

Referring back to FIG. **1**A, handwriting input device **110** may determine the font information regarding the font of the first part of the handwritten input with reference to the individual font databases stored in font database **130** based at least in part on the emotion attribute of the user. By way of example, but not limitation, when the identified user of the handwritten input is the user A and the determined emotion attribute of the user A is a happy state, handwriting input device **110** may look for a font that corresponds to the happy state with reference to individual font database **132** of the user A and determine the font information regarding the font of the first part as the font id of "font.userA.happy" **133***a* as shown in FIG. **1**B in order to provide the determined font information to receiving device **120**.

Handwriting input device **110** may generate a data file including the recognized text message, the image file and the font information. In some embodiments, handwriting input device **110** may combine and pack the text file, the image file and the font information into a single data file or a bitstream. Further, handwriting input device **110** may transmit the data file or the bitstream to receiving device **120** via a network. By way of examples, but not limitation, the network may include a wired network, a wireless local area network, a Wibro network or a Bluetooth network.

Receiving device **120** may receive the data file from handwriting input device **110** via a network. By way of example, but not limitation, the network may include a wired network, a wireless local area network, a Wibro network or a Bluetooth network. Receiving device **120** may segment the data file into the text message, the image file and the font information. Receiving device **120** may select a font based on the font information from one or more of the user's fonts which are stored in font database **130**. Receiving device **120** may access font database **130** using, e.g., a secret key or a password. In some embodiments, handwriting input device **110** may provide receiving device **120** with the secret key or the password, which is necessary to access to the individual font database of the user of handwriting input device **110**.

Receiving device **120** may generate the first part of the original handwritten input by applying the selected font to the text message. By way of example, but not limitation, receiving device **120** may combine a plain text message (which does not have a font) of the first part and the selected font, so that the first part having the font may be generated. Further, receiving device **120** may restore the second part of the original handwritten input from the image file by decompressing the image file and then, combine the generated first part and

the restored second part to regenerate the original handwritten input having the first part and the second part. Accordingly, receiving device **120** may restore the same handwritten input as the original handwritten input of the user. With reference to FIGS. **1**A and **1**B, although the handwritten input includes the first part and the second part, in some embodiments, the handwritten input may include only the first part including a text message. In that case, processes of handwriting input device **110** and receiving device **120** regarding the second part and the combining process by receiving device **120** may be omitted.

In some embodiments, the individual font databases stored in font database **130** may be sold in user font marketplaces. By way of example, but not limitation, some people may want to use other's fonts which are unique and/or beautiful, and such people may want to get the other's fonts even paying money. In such cases, one, who has an individual font database stored in font database **130**, may allow other people to use his/her fonts therein with or without charging.

In some embodiments, handwriting input device **110** may work with or include a speech-to-text system to generate a text message with speaker's emotion attribute. Specifically, the speech-to-text system may include a speech-to-text engine that converts a voice of a speaker into a text message and a context-aware engine that obtains emotion attribute of the speaker. In such cases, handwriting input device **110** may identify the speaker, the text message corresponding to his/her voice and his/her emotion attribute and determine the font information from font database **130**. The text message and the font information may then be transmitted to receiving device **120** for reproduction.

FIG. **2** shows an example flow diagram of a process **200** of handwriting input device **110** for transmitting a handwriting input to receiving device **120**, arranged in accordance with at least some embodiments described herein. The method in FIG. **2** may be implemented in communications environment **100** including handwriting input device **110**, receiving device **120** and font database **130**, as illustrated in FIG. **1**A. An example process may include one or more operations, actions, or functions as illustrated by one or more blocks **210**, **212**, **214**, **216**, **218**, **220**, **222**, **224**, **226** and/or **228**. Although illustrated as discrete blocks, various blocks may be divided into additional blocks, combined into fewer blocks, or eliminated, depending on the desired implementation. Processing may begin at block **210**.

At block **210** (Receive Handwritten Input), handwriting input device **110** may receive a handwritten input which includes a first part including a text message and a second part including an image. Although the handwritten input is described to include all of the first part and the second part, in some embodiments, the handwritten input may include only the first part including a text message. Processing may proceed from block **210** to block **212**.

At block **212** (Segment Handwritten Input into First part and Second part), handwriting input device **110** may segment the handwritten input into the first part and the second part. In some embodiments, if the handwritten input does not include the second part including the image, segmentation of the handwritten input may be omitted. Processing may proceed from block **212** to block **214**.

At block **214** (Recognize Text Message from First part), handwriting input device **110** may recognize the text message from the first part of the handwritten input using a conventional text recognition method. By way of example, but not limitation, handwriting input device **110** may extract the text message from the first part of the handwritten input and save the extracted text message as a text file with a file name of, for example, "note.txt." Processing may proceed from block **214** to block **216**.

At block **216** (Compress Second part into Image file), handwriting input device **110** may compress the second part of the handwritten input into an image file. By way of example, but not limitation, handwriting input device **110** may compress the second part into an image file with a file name of, for example, "figure.jpg." In some embodiments, if the handwritten input does not include the second part including the image, compression of the second part may be omitted. Processing may proceed from block **216** to block **218**.

At block **218** (Identify User), handwriting input device **110** may identify a user of the handwritten input. In some embodiment, handwriting input device **110** may identify the user based at least in part on a device identifier or log-in information regarding the handwriting input device **110**. The device identifier may include, but not limited thereto, a MAC address or an IP address of handwriting input device **110**. In some other embodiments, handwriting input device **110** may recognize a font of the handwritten input and identify the user associating the recognized font with the user. Processing may proceed from block **218** to block **220**.

At block **220** (Determine Emotion Attribute), handwriting input device **110** may determine an emotion attribute of the identified user based at least in part on the handwritten input. By way of examples, but not limitation, the emotion attribute may include a calm state, a happy state, an urgent state, an excited state, a depressed state, an angry state. In some embodiments, handwriting input device **110** may determine the emotion attribute based on various factors including contents of the text message, a size of the first part of the handwritten input, text writing speed of the user, pressure applied by the user when rendering the handwritten input, line alignment of the first part of the handwritten input, size regularity of the first part of the handwritten input, a number of spelling errors included in the first part, one or more emoticons included in the first part of the handwritten input, and/or one or more symbols included in the first part of the handwritten input. Examples regarding how to determine the emotion attribute based on those factors are described with reference to FIG. **3** below.

FIG. **3** schematically shows an illustrative example of an emotion attribute table **300**, arranged in accordance with at least some embodiments described herein. In some embodiments, handwriting input device **110** may measure an average writing speed based on writing time and the number of letters and/or characters in the first part and average writing pressure of the user using a pressure sensor associated with a touch screen or a touch pen of handwriting input device **110**. If the average writing speed is faster than a predetermined speed which may be stored on handwriting input device **110** and the writing pressure is stronger than a predetermined pressure which may be stored on handwriting input device **110**, as illustrated in FIG. **3**, handwriting input **110** may determine the emotion attribute of the user as the excited state. This may be because generally a person may write in high writing speed and in strong writing pressure when he/she is excited.

In another example embodiment, if a font size of the handwritten input is smaller than a predetermined font size which is stored on handwriting input device **110** and the number of spelling errors included in the handwritten input is smaller than a predetermined error number which is stored on handwriting input device **110**, as illustrated in FIG. **3**, handwriting input **110** may determine the emotion attribute of the user as the happy state. Further, in some other embodiments, if terms that may be associated with an urgent context, e.g., "hurry," is

included in the handwritten input, as illustrated in FIG. **3**, handwriting input device **110** may determine the emotion attribute of the user as one of anxiety.

Further, handwriting input device **110** may consider at least one of a time data, a schedule of the user or a place where the user is to determine the emotion attribute. The time data may be gathered from a clock or a timer included in handwriting input device **110**, and handwriting input device **110** may determine information regarding the place where the user is based on the schedule of the user, which is stored on handwriting input device **110**. By way of examples, but not limitation, if in the morning the user makes the handwritten input, as illustrated in FIG. **3**, handwriting input **110** may determine the emotion attribute of the user as one of calm and/or serenity. This may be because generally a person may be calm and write in the calm state in the morning.

Furthermore, handwriting input device **110** may consider at least one of a grip pressure of the user, a blood pressure of the user, a sweat amount of the user, a temperature of a place where the user is, a facial recognition data of the user or a voice data of the user to determine the emotion attribute. By way of example, but not limitation, handwriting input device **110** may include a temperature sensor, a humidity sensor, a camera, a microphone or pen/stylus having a grip pressure sensor and blood pressure sensor, a temperature sensor, a humidity sensor, a camera and a microphone. By way of examples, but not limitation, handwriting input device **110** may measure a grip pressure of the user and a blood pressure of the user using the microphone or pen/stylus having the grip pressure sensor and blood pressure sensor. If the grip pressure is stronger than a predetermined grip pressure value which is stored on handwriting input device **110** and the blood pressure is higher than a predetermined blood pressure value which is stored on handwriting input device **110**, as illustrated in FIG. **3**, handwriting input **110** may determine the emotion attribute of the user as the angry state. Processing may proceed from block **220** to block **222**.

Referring back to FIG. **2**, at block **222** (Determine Font Information), handwriting input device **110** may determine font information regarding a font of the first part of the handwritten input based at least in part on the emotion attribute which is determined at block **220**. In some embodiments, multiple fonts for the identified user and font information corresponding to the multiple fonts may be stored in font database **130** as illustrated in FIG. **1**B. Handwriting input device **110** may select a font corresponding to the first part of the handwritten input from the multiple fonts based at least in part on the emotion attribute and determine the font information corresponding to the selected font.

If the font and font information regarding the font of the first part of the handwritten input are stored in font database **130**, handwriting input device **110** may select the font and the corresponding font information. However, if there is no corresponding font for the font of the first part of the handwritten input found in font database **130**, handwriting input device **110** may select a font from font database **130**, which is the most similar to the font of the first part and determine the font information regarding the font of the first part as the font information of the most similar font from font database **130**. Thereafter, handwriting input device **110** may store the font of the first part (which does not exist in font database **130**) and the font information thereof in font database **130** and update font database **130**. Processing may proceed from block **222** to block **224**.

At block **224** (Recognize Additional Information), handwriting input device **110** may recognize additional information regarding the first part of the handwritten input. In some embodiments, the additional information may include at least one of a size of the first part of the handwritten input, a color of the first part, or a font thickness of the first part. Processing may proceed from block **224** to block **226**.

At block **226** (Generate Data File), handwriting input device **110** may generate a data file including the recognized text message, the image file, the font information and the additional information. In some embodiments, handwriting input device **110** may combine and pack the text file, the image file, the font information and the additional information into a single data file or a bitstream. Processing may proceed from block **226** to block **228**.

At block **228** (Transmit Data File), handwriting input device **110** may transmit the data file or the bitstream to receiving device **120** via a network. By way of examples, but not limitation, the network may include a wired network, a wireless local area network, a Wibro network or a Bluetooth network.

One skilled in the art will appreciate that, for this and other processes and methods disclosed herein, the functions performed in the processes and methods may be implemented in differing order. Furthermore, the outlined steps and operations are only provided as examples, and some of the steps and operations may be optional, combined into fewer steps and operations, or expanded into additional steps and operations without detracting from the essence of the disclosed embodiments.

FIG. **4** shows an example flow diagram of a process **400** of a receiving device **120** for receiving a handwritten input from handwriting input device **110**, arranged in accordance with at least some embodiments described herein. The method in FIG. **4** may be implemented in communications environment **100** including handwriting input device **110**, receiving device **120** and font database **130**, as illustrated in FIG. **1**A. An example process may include one or more operations, actions, or functions as illustrated by one or more blocks **410**, **420**, **430**, **440**, **450** and/or **460**. Although illustrated as discrete blocks, various blocks may be divided into additional blocks, combined into fewer blocks, or eliminated, depending on the desired implementation. Processing may begin at block **410**.

At block **410** (Receive Data File), receiving device **120** may receive a data file that includes a text message, an image file, font information regarding a font of a handwritten input and additional information regarding the handwritten information from handwriting input device **110**. In some embodiments, the handwritten input may include a first part including the text message and a second part that includes an image. The font information is determined by handwriting input device **110** based at least in part on an emotion attribute of a user of handwriting input device **110** as described in FIGS. **2**-**3**. The additional information may include at least one of a size of the first part, a color of the first part, or a font thickness of the first part. Further, at block **410**, receiving device **120** may segment the data file into the text message, the image file, the font information and the additional information. Processing may proceed from block **410** to block **420**.

At block **420** (Select Font), receiving device **120** may select the font of the first part of the handwritten input based at least in part on the font information. Multiple fonts of a user of handwriting input device **110** and the font information corresponding to the fonts may be stored in font database **130**. In some embodiments, font database **130** may include a cloud data center or may be stored in the cloud data center. Receiving device **120** may access to font database **130** using, e.g., a secret key or a password. In some embodiments, handwriting input device **110** may provide receiving device **120** with the

secret key or the password that is necessary to access to font database **130**. Processing may proceed from block **420** to block **430**.

At block **430** (Generate First Part of Handwritten Input), receiving device **120** may generate the first part of the handwritten input based at least in part on the text message and the font that is selected at block **420**. In some embodiments, receiving device **120** may apply the selected font to the plain text message, so that the first part including the text message of the handwritten input may be generated. Processing may proceed from block **430** to block **440**.

At block **440** (Apply Additional Information), receiving device **120** may apply the additional information to the first part which is generated at block **430**. Accordingly, the original first part of the handwritten input may be restored. Processing may proceed from block **440** to block **450**.

At block **450** (Restore Second Part of Handwritten Input), receiving device **120** may restore the second part of the handwritten input. In some embodiments, receiving device **120** may decompress the image file into the original image which is included in the second part, so that the original second part of the handwritten input may be restored. In some other embodiments, if the handwritten input includes only the first part, the process of block **450** may be omitted. Processing may proceed from block **450** to block **460**.

At block **460** (Combine First Part and Second Part), receiving device **120** may combine the first part of the handwritten input, which is restored at block **440**, and the second part of the handwritten input, which is restored at block **450**. Accordingly, receiving device **120** may generate the same handwritten input as the original handwritten input which is generated by the user of handwriting input device **110**.

One skilled in the art will appreciate that, for this and other processes and methods disclosed herein, the functions performed in the processes and methods may be implemented in differing order. Furthermore, the outlined steps and operations are only provided as examples, and some of the steps and operations may be optional, combined into fewer steps and operations, or expanded into additional steps and operations without detracting from the essence of the disclosed embodiments.

FIG. **5** shows a schematic block diagram illustrating an example architecture for a handwriting input device **110**, arranged in accordance with at least some embodiments described herein. As depicted in FIG. **5**, handwriting input device **110** may include a receiving unit **510**, a text message recognition unit **520**, an image file compression unit **530**, a user identification unit **540**, an emotion attribute determination unit **550**, a font information determination unit **560**, an additional information recognition unit **570**, a data file generation unit **580**, and a transmitting unit **590**. Although illustrated as discrete components, various components may be divided into additional components, combined into fewer components, or eliminated altogether while being contemplated within the scope of the disclosed subject matter. It will be understood by those skilled in the art that each function and/or operation of the components may be implemented, individually and/or collectively, by a wide range of hardware, software, firmware, or virtually any combination thereof. In that regard, one or more of receiving unit **510**, text message recognition unit **520**, image file compression unit **530**, user identification unit **540**, emotion attribute determination unit **550**, font information determination unit **560**, an additional information recognition unit **570**, data file generation unit **580**, and transmitting unit **590** may be included in an instance of an application hosted on handwriting input device **110**.

Receiving unit **510** may be configured to receive a handwritten input that includes a first part including a text message and a second part that includes an image from a user. Although the handwritten input is described to include all of the first part and the second part, in some embodiments, the handwritten input may include only the first part including the text message. Further, receiving unit **510** may segment the handwritten input into the first part and the second part.

Text message recognition unit **520** may be configured to recognize the text message from the first part of the handwritten input. Text message recognition unit **520** may recognize the text message using a conventional text recognition method.

Image file compression unit **530** may be configured to compress the second part into an image file. In some embodiments, image file compression unit **530** may compress the image included in the second part into an image file using a conventional image compressing method.

User identification unit **540** may be configured to identify the user of the handwritten input. In some embodiments, user identification unit **540** may identify the user based at least in part on a device identifier and/or log-in information regarding the handwriting input device **110**. The device identifier may include, but is not limited thereto, a MAC address or an IP address of handwriting input device **110**.

Emotion attribute determination unit **550** may be configured to determine an emotion attribute of the identified user based at least in part on the handwritten input. In some embodiments, emotion attribute determination unit **550** may determine the emotion attribute based at least in part on at least one of contents of the text message, a size of the first part of the handwritten input, text writing speed of the user, text writing pressure of the user, line alignment of the first part, size regularity of the first part, a number of spelling errors included in the first part, an emoticon included in the first part, one or more symbols included in the first part of the handwritten input, a time data, a schedule of the user, a place where the user is, a grip pressure of the user, a blood pressure of the user, a sweat amount of the user, a temperature of a place where the user is, a facial recognition data of the user or a voice data.

Font information determination unit **560** may be configured to determine font information regarding a font of the first part of the handwritten input based at least in part on the determined emotion attribute. In some embodiments, multiple fonts for the identified user and corresponding font information may be stored in font database **130**. Font information determination unit **560** may search for the font of the first part of the handwritten input from the multiple fonts corresponding to the identified user, which are stored in font database **130** based at least in part on the emotion attribute and determine the font information corresponding to the font of the first part.

Additional information recognition unit **570** may be configured to recognize additional information including at least one of a size of the first part of the handwritten input, a color of the first part, or a font thickness of the first part. For example, additional information recognition unit **570** may recognize the size of the first part of the handwritten input by comparing a size of characters of the first part and that of sample characters which are stored on handwriting input device **110**. Further, additional information recognition unit **570** may recognize the color of the first part of the handwritten input using a conventional color recognition method.

Data file generation unit **580** may be configured to generate a data file including the text message, the image file, the font information and the additional information. In some embodi-

ments, data file generation unit **580** may combine and pack the text message, the image file, the font information and the additional information into a single data file or a bitstream.

Transmitting unit **590** may be configured to transmit the data file or the bitstream including the text message, the image file, the font information and the additional information to receiving device **120** via a network.

FIG. **6** illustrates computer program products that may be utilized to provide a scheme for communication using handwritten input, arranged in accordance with at least some embodiments described herein. Program product **600** may include a signal bearing medium **610**. Signal bearing medium **610** may include one or more instructions **620** that, when executed by, for example, a processor, may provide the functionality described above with respect to FIGS. **1A-5**. By way of example, but not limitation, instructions **620** may include: one or more instructions for receiving a handwritten input including a first part including a text message; one or more instructions for recognizing the text message from the first part; one or more instructions for identifying a user of the handwritten input; one or more instructions for determining an emotion attribute of the identified user based, at least in part, on the handwritten input; one or more instructions for determining a font information regarding a font of the first part based, at least in part, on the emotion attribute; one or more instructions for generating a data file including the text message and the font information; and one or more instructions for transmitting the data file to a receiving device via a network. Thus, for example, referring to FIG. **2**, handwriting input device **110** may undertake one or more of the blocks shown in FIG. **2** in response to instructions **620**.

By way of example, but not limitation, instructions **620** may include: one or more instructions for receiving, from a handwriting input device, a data file including a text message of a first part included in a handwritten input and a font information regarding a font of the first part; one or more instructions for determining the font from the first part based, at least in part, on the font information; and one or more instructions for generating the first part based, at least in part, on the text message and the font of the first part. Thus, for example, referring to FIG. **4**, receiving device **120** may undertake one or more of the blocks shown in FIG. **4** in response to instructions **620**.

In some implementations, signal bearing medium **610** may encompass a computer-readable medium **630**, such as, but not limited to, a hard disk drive, a CD, a DVD, a digital tape, memory, etc. In some implementations, signal bearing medium **610** may encompass a recordable medium **640**, such as, but not limited to, memory, read/write (R/W) CDs, R/W DVDs, etc. In some implementations, signal bearing medium **610** may encompass a communications medium **650**, such as, but not limited to, a digital and/or an analog communication medium (e.g., a fiber optic cable, a waveguide, a wired communications link, a wireless communication link, etc.). Thus, for example, program product **600** may be conveyed to one or more modules of sender device **120** by an RF signal bearing medium **620**, where the signal bearing medium **620** is conveyed by a wireless communications medium **650** (e.g., a wireless communications medium conforming with the IEEE 802.11 standard).

FIG. **7** is a block diagram illustrating an example computing device that may be utilized to provide a scheme for communication using handwritten input, arranged in accordance with at least some embodiments described herein. In these examples, elements of computing device **700** may be arranged or configured for a device. In a very basic configuration **702**, computing device **700** typically includes one or more processors **704** and a system memory **706**. A memory bus **708** may be used for communicating between processor **704** and system memory **706**.

Depending on the desired configuration, processor **704** may be of any type including but not limited to a microprocessor (μP), a microcontroller (μC), a digital signal processor (DSP), or any combination thereof. Processor **704** may include one more levels of caching, such as a level one cache **710** and a level two cache **712**, a processor core **714**, and registers **716**. An example processor core **714** may include an arithmetic logic unit (ALU), a floating point unit (FPU), a digital signal processing core (DSP Core), or any combination thereof. An example memory controller **718** may also be used with processor **704**, or in some implementations memory controller **718** may be an internal part of processor **704**.

Depending on the desired configuration, system memory **706** may be of any type including but not limited to volatile memory (such as RAM), nonvolatile memory (such as ROM, flash memory, etc.) or any combination thereof. System memory **706** may include an operating system **720**, an application **722**, and program data **724**. Application **722** may include instructions **726** that may be arranged to perform the functions as described herein including the actions described with respect to handwriting input device **110** architecture as shown in FIG. **5** or including the actions described with respect to the flow charts shown in FIGS. **2** and **4**. In some examples, application **722** may be arranged to operate with program data **724** on an operating system **720** such that the communication schemes using a handwriting input as described herein may be provided.

Computing device **700** may have additional features or functionality, and additional interfaces to facilitate communications between basic configuration **702** and any required devices and interfaces. For example, a bus/interface controller **730** may be used to facilitate communications between basic configuration **702** and one or more data storage devices **732** via a storage interface bus **734**. Data storage devices **732** may be removable storage devices **736**, non-removable storage devices **738**, or a combination thereof. Examples of removable storage and non-removable storage devices include magnetic disk devices such as flexible disk drives and hard-disk drives (HDD), optical disk drives such as compact disk (CD) drives or digital versatile disk (DVD) drives, solid state drives (SSD), and tape drives to name a few. Example computer storage media may include volatile and nonvolatile, removable and non-removable media implemented in any method or technology for storage of information, such as computer readable instructions, data structures, program modules, or other data.

System memory **706**, removable storage devices **736** and non-removable storage devices **738** are examples of computer storage media. Computer storage media includes, but is not limited to, RAM, ROM, EEPROM, flash memory or other memory technology, CD-ROM, digital versatile disks (DVD) or other optical storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, or any other medium which may be used to store the desired information and which may be accessed by computing device **700**. Any such computer storage media may be part of computing device **700**.

Computing device **700** may also include an interface bus **740** for facilitating communication from various interface devices (e.g., output devices **742**, peripheral interfaces **744**, and communication devices **746**) to basic configuration **702** via bus/interface controller **730**. Example output devices **742** include a graphics processing unit **748** and an audio process-

ing unit **750**, which may be configured to communicate to various external devices such as a display or speakers via one or more A/V ports **752**. Example peripheral interfaces **744** include a serial interface controller **754** or a parallel interface controller **756**, which may be configured to communicate with external devices such as input devices (e.g., keyboard, mouse, pen, voice input device, touch input device, etc.) or other peripheral devices (e.g., printer, scanner, etc.) via one or more I/O ports **758**. An example communication device **746** includes a network controller **760**, which may be arranged to facilitate communications with one or more other computing devices **762** over a network communication link via one or more communication ports **764**.

The network communication link may be one example of a communication media. Communication media may typically be embodied by computer readable instructions, data structures, program modules, or other data in a modulated data signal, such as a carrier wave or other transport mechanism, and may include any information delivery media. A "modulated data signal" may be a signal that has one or more of its characteristics set or changed in such a manner as to encode information in the signal. By way of example, and not limitation, communication media may include wired media such as a wired network or direct-wired connection, and wireless media such as acoustic, radio frequency (RF), microwave, infrared (IR) and other wireless media. The term computer readable media as used herein may include both storage media and communication media.

Computing device **700** may be implemented as a portion of a small-form factor portable (or mobile) electronic device such as a cell phone, a personal data assistant (PDA), a personal media player device, a wireless web-watch device, a personal headset device, an application specific device, or a hybrid device that include any of the above functions. Computing device **700** may also be implemented as a personal computer including both laptop computer and non-laptop computer configurations.

The present disclosure is not to be limited in terms of the particular embodiments described in this application, which are intended as illustrations of various aspects. Many modifications and variations can be made without departing from its spirit and scope, as will be apparent to those skilled in the art. Functionally equivalent methods and apparatuses within the scope of the disclosure, in addition to those enumerated herein, will be apparent to those skilled in the art from the foregoing descriptions. Such modifications and variations are intended to fall within the scope of the appended claims. The present disclosure is to be limited only by the terms of the appended claims, along with the full scope of equivalents to which such claims are entitled. It is to be understood that this disclosure is not limited to particular methods, reagents, compounds, compositions or biological systems, which can, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular embodiments only, and is not intended to be limiting.

With respect to the use of substantially any plural and/or singular terms herein, those having skill in the art can translate from the plural to the singular and/or from the singular to the plural as is appropriate to the context and/or application. The various singular/plural permutations may be expressly set forth herein for sake of clarity.

It will be understood by those within the art that, in general, terms used herein, and especially in the appended claims (e.g., bodies of the appended claims) are generally intended as "open" terms (e.g., the term "including" should be interpreted as "including but not limited to," the term "having" should be interpreted as "having at least," the term "includes" should be interpreted as "includes but is not limited to," etc.).

It will be further understood by those within the art that if a specific number of an introduced claim recitation is intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such intent is present. For example, as an aid to understanding, the following appended claims may contain usage of the introductory phrases "at least one" and "one or more" to introduce claim recitations. However, the use of such phrases should not be construed to imply that the introduction of a claim recitation by the indefinite articles "a" or "an" limits any particular claim containing such introduced claim recitation to embodiments containing only one such recitation, even when the same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an" (e.g., "a" and/or "an" should be interpreted to mean "at least one" or "one or more"); the same holds true for the use of definite articles used to introduce claim recitations. In addition, even if a specific number of an introduced claim recitation is explicitly recited, those skilled in the art will recognize that such recitation should be interpreted to mean at least the recited number (e.g., the bare recitation of "two recitations," without other modifiers, means at least two recitations, or two or more recitations). Furthermore, in those instances where a convention analogous to "at least one of A, B, and C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, and C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). In those instances where a convention analogous to "at least one of A, B, or C, etc." is used, in general such a construction is intended in the sense one having skill in the art would understand the convention (e.g., "a system having at least one of A, B, or C" would include but not be limited to systems that have A alone, B alone, C alone, A and B together, A and C together, B and C together, and/or A, B, and C together, etc.). It will be further understood by those within the art that virtually any disjunctive word and/or phrase presenting two or more alternative terms, whether in the description, claims, or drawings, should be understood to contemplate the possibilities of including one of the terms, either of the terms, or both terms. For example, the phrase "A or B" will be understood to include the possibilities of "A" or "B" or "A and B."

In addition, where features or aspects of the disclosure are described in terms of Markush groups, those skilled in the art will recognize that the disclosure is also thereby described in terms of any individual member or subgroup of members of the Markush group.

As will be understood by one skilled in the art, for any and all purposes, such as in terms of providing a written description, all ranges disclosed herein also encompass any and all possible subranges and combinations of subranges thereof. Any listed range can be easily recognized as sufficiently describing and enabling the same range being broken down into at least equal halves, thirds, quarters, fifths, tenths, etc. As a non-limiting example, each range discussed herein can be readily broken down into a lower third, middle third and upper third, etc. As will also be understood by one skilled in the art all language such as "up to," "at least," and the like include the number recited and refer to ranges which can be subsequently broken down into subranges as discussed above. Finally, as will be understood by one skilled in the art, a range includes each individual member. Thus, for example, a group having 1-3 cells refers to groups having 1, 2, or 3 cells.

Similarly, a group having 1-5 cells refers to groups having 1, 2, 3, 4, or 5 cells, and so forth.

From the foregoing, it will be appreciated that various embodiments of the present disclosure have been described herein for purposes of illustration, and that various modifications may be made without departing from the scope and spirit of the present disclosure. Accordingly, the various embodiments disclosed herein are not intended to be limiting, with the true scope and spirit being indicated by the following claims.

What is claimed is:

1. A method performed under control of a handwriting input device, comprising:

receiving a handwritten input including a first part including a text message and a second part including an image;

segmenting the handwritten input into the first part and the second part;

recognizing the text message from the first part;

compressing the second part into an image file;

identifying a user of the handwritten input;

determining an emotion attribute of the identified user based, at least in part, on the handwritten input;

determining a font information regarding a font of the first part based, at least in part, on the emotion attribute, the font of the first part being selected from a plurality of fonts for the identified user; and

generating a data file including the text message, the font information and the image file.

2. The method of claim **1**, further comprising:

transmitting the data file to a receiving device via a network.

3. The method of claim **1**, wherein the determining of the emotion attribute is further based, at least in part, on at least one of contents of the text message, a size of the first part, text writing speed of the user, text writing pressure of the user, line alignment of the first part, size regularity of the first part, a number of typing errors included in the first part, an emoticon included in the first part, or a symbol included in the first part.

4. The method of claim **1**, wherein the plurality of fonts for the identified user are stored in a font database.

5. The method of claim **4**, wherein the font database includes a cloud data center.

6. The method of claim **1**, further comprising:

recognizing additional information including at least one of a size of the first part, a color of the first part, or a thickness of the first part, and

wherein the data file further includes the additional information.

7. The method of claim **1**, wherein the identifying of the user is based, at least in part, on at least one of the font of the first part or an identifier of the handwriting input device.

8. A method performed under control of a receiving device, comprising:

receiving a data file including a text message of a first part of a handwritten input, a font information regarding a font of the first part, and an image file corresponding to a second part including an image included in the handwritten input, the data file being generated by a handwriting input device;

selecting the font of the first part based, at least in part, on the font information, the font of the first part being selected from a plurality of fonts for a user of the handwriting input device; and

generating the first part based, at least in part, on the text message and the font of the first part,

wherein the font information is based, at least in part, on an emotion attribute of the user of the handwriting input device.

9. The method of claim **8**, wherein the plurality of fonts for the user of the handwriting input device are stored in a font database.

10. The method of claim **9**, wherein the font database includes a cloud data center.

11. The method of claim **8**, wherein the method further comprises:

restoring the second part based, at least in part, on the image file; and

combining the generated first part and the restored second part.

12. The method of claim **8**, wherein the data file further includes additional information including at least one of a size of the first part, a color of the first part, or thickness of the first part, and the method further comprises:

applying the additional information to the generated first part.

13. A handwriting input device, comprising:

a receiving unit configured to receive a handwritten input including a first part including a text message and a second part including an image;

a text message recognition unit configured to recognize the text message from the first part;

a user identification unit configured to identify a user of the handwritten input;

an emotion attribute determination unit configured to determine an emotion attribute of the identified user based, at least in part, on the handwritten input;

a font information determination unit configured to determine a font information regarding a font of the first part based, at least in part, on the emotion attribute, the font of the first part being selected from a plurality of fonts for the identified user;

an image file compression unit configured to compress the second part into an image file; and

a data file generation unit configured to generate a data file including the text message, the font information and the image file.

14. The device of claim **13**, further comprising:

a transmitting unit configured to transmit the data file to a receiving device via a network.

15. The device of claim **13**, wherein the emotion attribute determination unit determines the emotion attribute based, at least in part, on at least one of contents of the text message, a size of the first part, text writing speed of the user, text writing pressure of the user, line alignment of the first part, size regularity of the first part, a number of typing errors included in the first part, an emoticon included in the first part, or a symbol included in the first part.

16. The device of claim **13**, further comprising:

an additional information recognition unit configured to recognize additional information including at least one of a size of the first part, a color of the first part, or thickness of the first part, and

wherein the data file further includes the additional information.

17. The device of claim **13**, wherein the user identification unit identifies the user based, at least in part, on at least one of the font of the first part, or an identifier of the handwriting input device.

18. The device of claim **13**, wherein the plurality of fonts for the identified user are stored in a font database.

19. The device of claim **18**, wherein the font database includes a cloud data center.

20. A non-transitory computer-readable storage medium having stored thereon computer-executable instructions that, in response to execution, cause a handwriting input device to perform operations, comprising:

receiving a handwritten input including a first part including a text message and a second part including an image;

segmenting the handwritten input into the first part and the second part;

recognizing the text message from the first part;

compressing the second part into an image file;

identifying a user of the handwritten input;

determining an emotion attribute of the identified user based, at least in part, on the handwritten input;

determining a font information regarding a font of the first part based, at least in part, on the emotion attribute, the font of the first part being selected from a plurality of fonts for the identified user;

generating a data file including the text message, the font information and the image file; and

transmitting the data file to a receiving device via a network.

21. The computer-readable storage medium of claim 20, wherein the determining of the emotion attribute is based, at least in part, on at least one of contents of the text message, a size of the first part, text writing speed of the user, text writing pressure of the user, lane alignment of the first part, size regularity of the first part, a number of typing errors included in the first part, an emoticon included in the first part, or a symbol included in the first part.

22. A non-transitory computer-readable storage medium having stored thereon computer-executable instructions that, in response to execution, cause a receiving device to perform operations, comprising:

receiving, from a handwriting input device, a data file including a text message of a first part included in a handwritten input, a font information regarding a font of the first part, and an image file corresponding to a second part including an image included in the handwritten input;

determining the font from the first part based, at least in part, on the font information, the font of the first part being selected from a plurality of fonts for a user of the handwriting input device; and

generating the first part based, at least in part, on the text message and the font of the first part,

wherein the font information is based, at least in part, on an emotion attribute of the user of the handwriting input device.

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